Infant Disorganized Attachment: Clarifying Levels of Analysis

Abstract

Infant disorganized attachment has been criticized as too nebulous, causing confusion and premature theoretical closure in the clinical, forensic and research contexts where it is used. Responding to such calls, this paper offers distinctions to clarify the concept of disorganized attachment with the goal of increasing understanding, and ultimately to improve the theoretical and empirical precision and power of this construct. In particular, attention is drawn to the fact that there are many indices used to code "disorganized attachment", and that so far they have been validated as a set rather than individually; this raises the concern that the validation of disorganization is at best partially finished.

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Introduction

Three classifications for infant behavior in the Strange Situation were introduced by Ainsworth et al. (1978). These distinct patterns of behavior were understood to represent strategies for achieving the physical and attentional availability of the caregiver, strategies which systematically varied as a function of the caregiver's responses to their child's signals of distress. An additional, insecure-disorganized/disoriented (D) classification for coding the Ainsworth Strange Situation was collaboratively introduced by one of the authors of the present paper (Main and Solomon 1990). The classification was based on the observation of usually brief, out-of context, unexpected, or anomalous behaviors, which suggested a high level of conflict about approach to the caregiver, disorientation, or fear in relation to the caregiver. The D classification has been widely assumed to represent the breakdown of behavior, undifferentiated chaos; in Spangler and Schieche (1998: 700), for instance, the authors write that "as disorganized infants, *by definition,* do not have any coherent strategies,

behavioral regulation is restricted or even not possible at all." Likewise other researchers describe disorganization as the "lack of any strategy" or the "lack of any way of coping with stress", and theorize on this basis. To take a example from a recent and important paper: "disorganization is defined as the collapse of attachment strategy under conditions of stress; under such conditions, disorganized individuals select a set of behaviors that are irrelevant to their need for downregulation of discomfort" (Wazana et al. 2015: 1157).

The chapters by Main and Solomon (1986, 1990) have served as a guidepost, prompting a good deal of significant developmental attachment research. Yet as is common in the history of science (Hacking 2004), subsequent findings now point to the need for refinements and clarifications, to avoid a reification of the original construct. The time has come for such reassessment of the account presented in the Main and Solomon chapters especially in the context of calls in recent years from attachment researchers and clinicians for further consideration of what has been captured by the concept of "disorganized" attachment (see e.g. Bernier & Meins 2008; Lyons-Ruth et al. 2013; Slade 2014; Padrón et al. 2014; Hollidge & Hollidge 2016; Beeney et al. 2016; Lyons-Ruth & Jacobvitz 2016). Especially in Europe, some clinicians and researchers have, following Crittenden (2008), avoided or abandoned use of the disorganized classification, adopting other frameworks. Others have urged further work to understand the construct and refine its usage as well as the language we have to discuss it. For instance, Tarren-Sweeney (2014: 334) has argued that "further research is needed to understand the nature and clinical meaning of the disorganised attachment category", and Waters et al. (2015: xxxii) have expressed concern that "if we allow the charm of interesting labels to undermine clear thinking and problem formulations or to suggest magical explanations, we risk losing the key descriptive and theoretical insights underlying attachment theory." In this context, our view is that some conceptual housekeeping is necessary. We argue in this paper that the term "disorganization" can refer to events and constructs at different levels of analysis, and that these are too often confused. In doing so, we hope to move discussions of "disorganization" to firmer conceptual ground, and prompt further work to assess the significance of disorganized attachment behaviors.

The origin and significance of "attachment disorganization"

In Bowlby's (1969) account of attachment, under typical rearing conditions in which a familiar caregiver is available, human infants become motivated to approach their primary

caregivers when alarmed, tired or ill, or following a separation. Bowlby presented the construct of an "attachment behavioral system" or "attachment system" to explain the operation and development of this motivational tendency. This system regulates attention, affect and behavior, a process that includes recruiting and coordinating expectations based on past events, in order to achieve the physical and attentional availability of the caregiver. Once this goal is achieved, the attachment system becomes quiescent, permitting the infant to pursue other ends, such as exploration of the environment or affiliation with friendly people, though the infant will continue to monitor the environment for potential threats and for the whereabouts of their caregiver.

Bowlby's account of the attachment system was used to conceptualize infant behavior in the Ainsworth Strange Situation (Ainsworth et al. 1978). In this procedure, a caregiver takes leave of and returns to their infant twice in a novel environment with interesting toys, first leaving the child with a stranger and then alone. The caregiver's actions are therefore standardized to a large degree, allowing attention to be paid to the infant's behavior and the expectations these implicitly reveal about the relationship. Three patterns of infant behavior were initially identified by Ainsworth and colleagues, reflecting different ways to achieve proximity and the availability of the caregiver (Main 1979). After the separation episodes, most infants seek proximity with the caregiver immediately, calm if they have been distressed, and return to play within the first one or two minutes of the reunion. This pattern corresponds to Bowlby's model of the expression of the attachment behavioral system. This pattern in the Strange Situation was found by Ainsworth, as well as later researchers, to reflect the experience of a familiar caregiver who responds to the infant's signals of distress with prompt and sensitive contact and soothing. Ainsworth termed the pattern "secure" (B). Infants classified as "avoidant" (A) initially direct their attention and orient away from the caregiver, regulating themselves through a focus on toys, though most will show a delayed inclination to approach. Ainsworth observed that at home the caregivers of these infants were frequently seen to rebuff physical contact or to be insensitively intrusive. She theorized that infants displaying the avoidant attachment pattern could avoid the distress of rejection or uncomfortable interaction with their caregiver (Ainsworth et al. 1978; Isabella & Belsky 1991). Infants classified ambivalent/resistant (C) utilize displays of anger and/or passive, helpless distress to maintain the attentiveness of a caregiver who, at home, tended to delay responding or whose availability might be inconsistent, and who discouraged their autonomy. Though relatively stable, researchers have found that an infant's attachment pattern may

change over time in predictable ways if there are changes in the caregiving environment they experience (Sroufe et al 2005).

A fourth Strange Situation classification, 'disorganized/disoriented', was added by Main and Solomon (1986, 1990). Infant behaviors coded as disorganized/disoriented were clustered based on their apparent morphology into seven indices:

I. Sequential displays of contradictory behavior;
II. Simultaneous display of contradictory behavior;
III. Undirected, misdirected or incomplete movements;
IV. Stereotypies, mistimed movements and anomalous postures;
V. Freezing or stilling;
VI. Display of apprehension of the caregiver;
VII. Overt signs of disorientation or disorganization.

Under each of these "indices" Main and Solomon listed exemplars drawn directly from observation. To guide the coder toward a classification decision, some of these exemplars were placed in *italics* as, on their own, sufficient warrant for an overall disorganized/disoriented classification; others were not placed in italics, with the implication that several would need to accrue before the disorganized/disoriented classification should be considered. It was theorized that, to varying degrees, these different behaviors could be regarded as expressions of conflict or disarray at the level of the attachment system. As such, it was advised that a D classification should always be assigned, where possible, with a "best-fit" "secure", "avoidant", or "resistant" classification as the underlying pattern for which disorganization represented a disruption. Main and Hesse (1990) suggested that one sufficient cause of conflict at the level of the attachment system, though not necessarily the only one, would be an infant's experience of a caregiver who displays frightening or frightened behaviors towards them. Observations of parent-infant interaction have both confirmed and elaborated this hypothesis (Madigan et al. 2006). Interviews with mothers of infants classified as disorganized/disoriented show that they experience themselves as helpless, i.e. out of control or very emotionally dependent upon the child.

Since the disorganized/disoriented classification was introduced by Main and Solomon (1990), infants whose relationships have received this classification have been found to be

substantially more common in at-risk samples (Cyr et al. 2010), and the classification has proven predictive of later child mental health. Infants classified as disorganized/disoriented across both high risk and low risk samples appear to have an elevated risk of later externalizing disorders (d = 0.34, Fearon et al. 2010). Hygen et al. (2014) report that in their study, like other samples, 85% of infants classified as disorganized/disoriented show either controlling-and-caregiving or controlling-and-punitive behavior to their attachment figure by age 6. Following Main and Cassidy (1988), it is assumed that the controlling strategies are helping to render a parent's caregiving more predictable even if, especially for the controlling-and-punitive child, there may be attendant negative consequences. On the basis of such predictive validity, definitely of important note but moderate for a finding in developmental science, rather strong claims have been made for the classification. Ballen et al. (2010: 118) have observed that, "in the last decade, the field of developmental psychopathology has devoted increasing interest to what appears to be one of the most meaningful risk factors for later maladjustment: infant disorganized attachment".

Revisiting "disorganization" in Main and Solomon

Wittgenstein (1980), among others, has observed that divergence between the use of a term in scientific psychology and in ordinary language is common; he noted that the nature of such divergence should, however, be identified if bedeviling confusion is to be avoided. Bowlby made much the same claim across his writings, warning that "it becomes easy for the unwary to assume that, because in common speech words are used without discrimination, whatever is referred to can be treated as though it were undifferentiated." (1973: 118). In discussing the term 'mourning', for example, he notes that psychological usage is not quite the same as ordinary language, but that the term has an encompassing quality which makes it "possible to link together a number of processes and conditions that evidence shows are interrelated" (1979: 100). Bowlby urged that the fact that psychological processes are interrelated should not lead researchers to fail to distinguish them conceptually and empirically.

Ainsworth (1972) had introduced "organization" as just such a technical term. In her usage, it served to describe the way the infant's attention and behaviors were brought together to form a coherent pattern which functioned smoothly as a whole to maintain the availability of the caregiver in the Strange Situation. The term "disorganization" therefore appealed to Main and Solomon as a way of thinking about discrepant infant behaviors in the Strange Situation. It

was preferred to "disordered attachment", an early alternative, as the term "disorganized" was considered less stigmatizing (see Duschinsky 2015). Yet, looking back with the advantages of hindsight, it is clear that use of the term has caused confusion. A first and perhaps the overriding problem has been that, corresponding to Ainsworth's technical use of the term "organized", uses of the term "disorganized" differed from the dictionary definition – and that this was not noted by Main and Solomon at the time, a fact that both authors now regret (Mary Main, personal communication). The dictionary, everyday meaning of the term "disorganization" suggests randomness and a lack of predictable responsiveness to contingencies: "to destroy the organization or systematic arrangement of; to break up the organic connection of; to throw into confusion or disorder" (Oxford English Dictionary 2016). None of the senses given the word in Main and Solomon's (1986, 1990) book chapters were intended to imply this, or that the behavior would be stable between the Strange Situation and the infant's home context.

Yet as well as departing from everyday uses of the term 'disorganized', in retrospect a second problem has been that the chapters introducing the classification used the term 'disorganization' in different ways which often but do not necessarily overlap. In particular, "disorganization" was used to describe both *observable behavior* and the invisible *psychological process* inferred from visible behavior. Thus the term was used as a characterization of:

1. *Contradiction or confusion in the morphology of observable behavior in the Strange Situation* (e.g. "the most striking theme running through the list of recorded behaviors was that of disorganization or, very briefly, an observed contradiction in movement pattern" 1990: 113, such as crying and approaching the caregiver, but with head sharply averted);
2. *Disruption inferred to be occurring at the level of the infant's attachment behavioral system, a psychological process* (e.g. hand-to-mouth behavior on reunion as a "*direct* index of disorganization" 1990: 139). This second usage somewhat resembles the dictionary definition, but is a description of the relative predicament of contradiction or disarray of a specific behavioral system. It is not the full and settled state for the organism as a whole which suggested by the dictionary definition of "disorganization".

This unfortunate and potentially misleading shift in levels in the chapters can be noted, for instance, in the description of "confused or confusing sequences of very rapid changes of affect in first few seconds of reunion with parent" as suggesting disorganization (1990: 140). "Confused" sequences are observable in the infant. The term refers to behavior and movement which has the characteristic of being confused. By contrast, "confusing" sequences are those where the child's goals are not clear. The coder is not able to tie behavior to an apparent motive. But both "confused" and "confusing" sequences are termed "disorganized", because of the pivoting of this latter term in the Main and Solomon chapters. A vignette may help clarify the point:

Toby is 15 months old, seen in the Strange Situation with his mother as part of a study of the implications for attachment of parental divorce, conflict and overnight visitation. Following a three-minute separation, his mother re-enters. Toby gets up and walks diagonally across her towards the corner of the room, where he stands facing the join in the wall. The stranger heads out the door and closes it behind her. Toby makes his way to the stranger's chair. As he gets there, he loses his balance. Sitting on the floor, he looks around the room, as if searching for the stranger. Toby's scanning of the room alights on mother; his face darkens on seeing her. He then is quite still for ten seconds. There is no movement besides the rise and fall of his chest. Mother makes a comment about the toys to him. Toby gets himself up and makes an approach to his mother.

Commentary: On reunion with a caregiver following a brief separation, Bowlby's theory suggests that the attachment system will dispose attachment behavior to retain the attentional and physical availability of the caregiver. Ainsworth's most salient discovery was that this disposition may be blocked when an infant directs attention away from their attachment figure and towards the environment, a process which forms the avoidant (A) pattern. Toby does seem to have been stirred by his caregiver's re-entry. However his approach behavior, if approach it is, is not directed to his mother but sends him to the corner of the room. The behavior is serving to direct his attention away from the caregiver and towards the environment. It is therefore technically avoidant. But smoothly-sequenced avoidance would send the child away from mother; a trajectory which runs diagonally across mother's path suggests contradiction at the level of intention or plan. In the confusingly circular language used in the Main and Solomon chapters, Toby's *disorganized behavior* is suggesting *disorganization of the attachment system*. In fact, however, these do not always correspond, a point which can be illustrated by "misdirected behaviors" (Index III) such as trying to follow

the stranger out of the room after being reunited with the caregiver. These are considered disorganized in the Main and Solomon chapters since they contradict the expected behavioral output of the attachment system to seek what proximity and availability may be expected to be on offer from the caregiver following a separation. Such misdirected behavior may actually be smoothly sequenced and show no "contradiction of movement pattern" at the motor level. However, he is not orienting around either the caregiver or the environment and the behavior can be *inferred* to represent a disruption of the attachment system because the apparent lack of orientation suggests a contradiction or disruption in intention or plan.

In using the same term "disorganized" to refer to both behavior and/or psychological process, Main and Solomon (1990: 133) had a specific aim, though it was not well articulated at the time. "Disorganization" was used as a conceptual tool for picking out "an observed contradiction in movement pattern, *corresponding* to an inferred contradiction in intention or plan" (1990: 133). The goal was to laminate i) observable behavior and ii) psychological process at the level of imputed behavioral systems, with the latter as the ultimate focus of their attentions. The reason for this move was in order to explain why no further discrete infant attachment "organizations", in Ainsworth's technical sense of the term, were apparent to them, and to justify what at the time was felt to be the "radical notion that the many, highly diverse indices of disorganization and disorientation can be placed under one heading" (1990: 151). The theoretical stakes of using the term "disorganized" to mean both behavior and psychological process was the claim that the diverse behaviors picked up by the Main and Solomon indices could well have different antecedents and sequalae, but what they had in common was that they suggested disruption or breakdown at the level of the attachment system.

As we have seen, the term "disorganization" was used in the Main and Solomon chapters to refer to a *contradiction in observed movement* pattern, and to refer to some degree of breakdown at the level of the attachment system as a *psychological process*. Yet a further, distinct, usage of the term "disorganization" was in terms of *taxonomy* or classification. Where behavioral indices of disorganization are present, the Main and Solomon protocols indicate a coder should consider assigning the infant's Strange Situation behavior to a disorganized/disoriented (D) classification. To facilitate this task, Main and Solomon (1990) presented general guidelines and a 9 point scale without behavioral anchors for ranking how certain a coder is that they are seeing an interruption or breakdown of the attachment system, where 5 is sufficient for placement of the dyad into a D classification. On retrospective

examination, the scale for coding disorganization as a taxonomic entity threads together four or five different characteristics of behavior. These are at most partially specified – a fact that has not only caused confusion about the classification, but contributed to a situation in which only very few who attend training successfully achieve reliability in coding D. However, the weightings can be gleaned from the commentary on the indices (Main & Solomon 1990: 151), the brief descriptions that accompany the scale points, and detailed scrutiny of which behaviors are italicized. The weightings, retrospectively, appear to be: i) frequency of a behavior, ii) its pervasiveness or duration, iii) its abruptness in behavioral sequence, iv) the extent to which it occurs either close to reunion or in physical proximity with the caregiver, and v) whether it can be better explained as a reaction to the immediate environment. A sixth weighting used by coders taught by Mary Main or Elizabeth Carlson, and arising from Main and Hesse's (1990) theory, is the extent to which the infant's responses to their caregiver suggest the experience of fear.

The term "disorganization" was therefore also used in a third sense, as a taxonomic label. The term was used to refer to:

3. *Infants who scored 5 or more on the 1-9 scale* delineated in Main and Solomon (1990). The scale indicates the certainty with which the coder perceives that the behaviors they can observe are indicative of a conflict which is disrupting or unraveling the coordination of the attachment system.

These three different uses of the term "disorganized" are shown in Table 1.

Table 1: Uses of the term "disorganization" in Main and Solomon (1990)

Use of the term "disorganized"	**D-behav**ior	**D-sys**tem	**D-class**ification
Level of analysis	Observable behavior	Psychological process inferred from behavior pattern	Insecure-disorganized/disoriented classification
Refers to…	Behavior which appears sudden, out of context,	Infant's attachment system is	A taxonomic label for an relationship in

	disrupted, anomalous, contradicted, misdirected, frightened or disoriented.	disturbed or contradicted to a significant degree by a countervailing affect or intention.	which substantial conflict at the level of the attachment system is inferred.
Illustrative quotation from Main and Solomon (1990)	"The most striking theme running through the list of recorded behaviors was that of disorganization" p.133	"Support for the disorganizing effect of frightening behavior on the part of the parent was obtained in two recent studies of maltreated infants" p.124	"The main purpose of the present paper is to formally present a set of indices… that will permit the identification of D" p.125

To avoid confusion, and to increase understanding of the meaning of disorganization and its clinical significance, distinctions are needed between these different levels of analysis. Specifically, research will be helped by the availability of a distinction between D as *an attachment classification* running orthogonal to the Ainsworth categories (distinguishable as **D-class**); D as the *behaviors listed in the Main and Solomon indices* (distinguishable as **D-behav**); and D as the *imputed disruption or disturbance of the attachment system* and its plan to gain the physical and attentional availability of the caregiver (distinguishable as **D-sys**). What kinds of behaviors that would count as expressing or as representing disturbance of the "attachment system" have varied as a function of different theorists' understanding of the attachment system itself, and hence interpretations of what disorganization might mean (see Crittenden & Ainsworth 1989). Increasing numbers of researchers today are in fact short-circuiting concerns about the nature of the attachment system construct by redescribing disorganization as "affective dysregulation", cutting out reference to disruption of the attachment system (e.g. DeOliveira et al. 2004). Yet such a redescription demands but does

not implement a change in coding criteria: not all forms of affective dysregulation appear in the Main and Solomon indices (e.g. inconsolable weeping), and not all of the behaviors listed in the indices suggest affective dysregulation (e.g. well-sequenced approach to the caregiver for a hug, but with a depressed facial expression).

We do not anticipate that distinguishing D-class, D-behav and D-sys will always be necessary when meaning is clear from context, but anticipate they will be useful as a resource for thinking and for pin-pointing phenomena for discussion or inquiry. We hope that they can offer some counterweight to expectations in some quarters of clinical and child welfare practice that "disorganization" is a fixed individual state and property, consigning a child to pathology regardless of resources and interventions offered to support the caretaking environment. Similarly, awareness of these distinctions may help support attention by researchers and practitioners (e.g. Hygen et al. 2014) to the important question of what developmental pathways might be expected in terms of heterotypic continuity in D-behav over time, where some form of D-sys remains; or what forms of D-behav might be expected *after* an intervention has caused a change in the caregiver's behavior but before their child's expectations have caught up. In making available distinctions in relation to the infant disorganized classification, we also hope that some greater subtly might be gained in thinking about intensities and forms of D-sys, and their different expression, in the many measures modeled on the infant system for assessing older children and adolescents, It is also anticipated that these distinctions will be useful in sharpening recognition that the behaviors listed in the Main and Solomon indices may not always express disorganization at the level of the attachment system, as for instance in the case of autistic stereotypies (Granqvist et al. 2016).

Above all, we hope that awareness of these different levels of analysis can reduce the widespread practice among researchers and clinicians of jumping from the term to conclusions (see e.g. Spangler and Schieche, and Wazana et al., quoted in the Introduction), and the equally widespread practice of talking past one another about "disorganization" and causal processes, such as whether all infants showing D-behav are scared of their caregiver in the same way and to the same degree. To offer one example how these distinctions may be helpful in clarifying discussions, let us take the account in Main (1995) and Hesse and Main (2000) of disorganization/disorientation as "the collapse in attentional and behavioral strategy". This reference to a "collapse" of strategy has been widely misunderstood, with many presuming that disorganization/disorientation as a collapse in behavioral and attentional

strategies always means a pervasive and chaotic display of observable behavior. This misunderstanding was unfortunately and inadvertently predisposed by the fact that a child physically collapsing to the floor was used as a privileged example in Main and Hesse's texts of collapse at the level of strategy. In fact, however, the discussion of "collapse in attentional and behavioral strategy" was intended as a statement about the (invisible) attachment behavioral system (D-sys) and was not necessarily intended as a description of observable attachment behavior (D-behav) or an encompassing characterization of the attachment relationship (D-class).

Similarly, the distinction between levels of analysis can help clarify the status of two of the Main and Solomon indices which very frequently cause confusion to those learning to code. These two indices describe behavior which may, in fact, be coherently sequenced, understandable and responsive to caregiver cues. It is not apparent, without distinguishing levels of analysis and a sharp awareness of the divergence from the dictionary definition, why such behaviors could be considered "disorganized":

i) An observation of the infant hiding under a chair as the parent returns would be coded as a display of "apprehension of the caregiver" (Index VI). Even at the time Main and Solomon (1990: 146) expressed concerned awareness that "signs of apprehension may seem less disorganized or disoriented than many of the other behavior patterns" – the behavior may be smoothly enacted, without signs of conflict, and adaptive to the caregiver's past or present behavior. At another level, however, the behavior is disorganized because it indicates a powerful disruption of the attachment system (D-sys) which would be expected otherwise to induce a scared child to achieve proximity to the caregiver. Indeed as a strong indicator, this behavior might be sufficient to place the child into the "disorganized/disoriented" classification (D-class).

ii) A similar jump across levels of analysis causes confusion in thinking about sequential contradiction of behavior between episodes (Index I). Crying desperately for the parent during separation followed at the moment of reunion by a blank expression and movement away (i.e., avoidance) does not necessarily appear disordered at a motor level. Such shifts between distress and avoidance, as Crittenden and Ainsworth (1989) observe in their discussion of sequential contradictory behavior, certainly may in some infants be smoothly sequenced,

responsive to the caregiver's cues, and without other markers of tension or loss of regulatory control (it is for this reason that such behavior is regarded by Crittenden as an additional coherent pattern of attachment, A/C, rather than characterizable as disorganization). Like an infant classified as avoidant (A), the behavior could even be regarded as "strategic" in Main's (1979) sense of serving to permit what proximity to the caregiver is readily available. At the same time, acute disjuncture of allocation and direction of attention between episodes suggests a contradiction at the level of D-sys. To draw a comparison, a child following a familiar Ainsworth avoidant (A) attachment pattern *does* experience conflict between a desire to approach and to inhibit approach to the caregiver. However the infant typically shows little or no distress in separation as long as he or she is not alone in the room, as attention is successfully directed away from the demands of the attachment system in a consistent way across episodes.

The difficulty these two examples present readers of Main and Solomon and those learning to code is not incidental, but expresses something important about differences among D-behav. It is entirely questionable whether Index I (sequential contradictory behaviors) and Index VI (apprehension of the caregiver) occur through the same psychological mechanisms, mean the same thing, or have the same sequalae. It is also unknown how often they co-occur. Our suspicion is that they do not, a hypothesis we are in the process of testing. Nonetheless in both cases avoidance of the caregiver was regarded by Main and Solomon as signifying disruption at the level of the attachment behavioral system (D-sys), and hence form the basis for an overall D classification at the level of taxonomy. Whereas Wazana et al. (2015: 1157) assume, based on what the word disorganized means in ordinary language, that "disorganized individuals select a set of behaviors that are irrelevant to their need for downregulation of discomfort", we can see that this may be an oversimplification. In distinguishing between levels of analysis, differences of degree and kind among D-behav come into view.

Implications and applications

We have argued that partly as a product of Main and Solomon's formulation and partly the result of misunderstandings of that formulation, there has been a conflation of the behavioral, systems, and taxonomic levels of analysis in using the term. This has been compounded by reification of Main and Hesse's "fear without solution hypothesis" as the sole cause of disorganization, without recognition that the different forms of D-behav do not by any means

necessarily all indicate fear in the same way or to the same degree, if at all. The resulting desiccation of the concept of disorganization has supported accounts, including from major figures in developmental psychology, of disorganized/disoriented attachment behavior as an *undifferentiated set*, caused by disorganization/disorientation as a *unitary process* (see e.g. Cummings 1990; Gergely 2004). Such assumptions have not just led to linguistic ambiguities but materially shaped the field's methodology, such as over-reliance on a simple D/non-D classification, and throwing away data on disorganized behaviors where these do not reach the D-class threshold. It is notable that where researchers have found contradictory results, as for instance with the relationship between DRD4 repeat polymorphism and disorganization (e.g. Wazana et al. 2015) or the relationship between disorganization and later dissociative behaviors (e.g. Haltigan & Roisman 2015), it does not appear to even be considered that the anomalous results could be a consequence of *different forms* of disorganization differentially predominating in the respective samples.

It should be acknowledged that there was something of a tendency in the work of Main and colleagues in the early 1990s to depict disorganization as unitary in its *undifferentiated chaos* (e.g. Main 1993). Generally researchers do not discuss this, they just assume it. There are, however, some who have explicitly claimed that disorganization represents undifferentiatedly meaningless behavior (e.g. DeOliveira et al. 2004; Beebe & Lachmann 2014; Daniel 2015). For these researchers, an important piece of evidence used to show that disorganized/disoriented attachment can be simply regarded as undifferentiated overwhelming negative affect is Spangler and Grossmann (1993), who report that the infants classified as D in their sample had a distinct heart-rate pattern. However, Spangler and Grossmann (1999: 102) later acknowledged that the overwhelming majority of the association between D and heart-rate was attributable to infants who showed Index VII behavior ("direct indices of disorganization"), and there was no effect on heart-rate at all for Index I or II behaviors ("sequential" or "simultaneous contradiction"). As such, the most widely-cited evidence used to support claims that the different behaviors in the Main and Solomon indices are equal and equivalent expressions of a unitary process of breakdown in fact suggests the opposite. In more recent physiological research, with the large Generation R sample, Luijk et al. (2010) found that, in contrast to infants classified as A, B or C, infants classified as D had a more flattened diurnal cortisol pattern ($F\ (1, 213) = 3.99$, $p < .01$, $\eta 2 = .03$). However, in light of Spangler and Grossmann's later acknowledgement, it would be interesting to ask whether this association with flattening of diurnal cortisol was generated

particularly by particular forms of D-behav. Already in *Patterns of Attachment* (1978: 276), Ainsworth and colleagues were calling for the use of physiological measures to assess whether what was then called "tension movements" represented all the same degree of stress. Ainsworth's question has remained unrecognized, invisible to the field.

Many examples of clinicians reading Main and Solomon's chapters through the lens of the everyday connotations of "disorganization" and conflating levels of analysis could be given. One influential case of an interpretation along these lines is Brown and Ward (2013), a text by two British psychologists which appealed to the authority of work on disorganized attachment in providing the mandate for a radical (and controversial) shift in how proceedings to take children into care operate within the British family courts (see Holt & Kelly 2016). Brown and Ward assert that attachment disorganization occurs when infants are "fearful of approaching their caregivers because they cannot predict the response: sometimes they may be picked up and cuddled, but at other times they may be shouted at or smacked. As a result, these children are not able to 'organize' their own behavior, and… behave unpredictably." For Brown and Ward, then, "disorganization" means that unpredictability without logic in the parent breeds unpredictability without logic in the child, mediated by the infant's fear of their caregiver. Brown and Ward imply that clinicians who see any disorganized attachment behaviors should therefore regard a child as at a great deal of risk, and court procedure must be changed to act fast and drastically. Similarly, Rees (2011: 187) has urged pediatricians that "disorganized patterns arise if pervasive abuse leaves children ineffective both in self-sufficiency and in using relationships, lacking understanding of their own and others' feelings. Safe independence is unlikely and criminality in adulthood common without recovery." In statements like this, clinicians and researchers appear to ride assumptions about the term "disorganization" to overblown conclusions. And it is a short step from the notion of disorganization as fearful chaos to the misapprehension of a D classification as a marker of pathology, in itself requiring social services intervention.

From the point of view of a clinical practitioner, Slade (2014: 259) has expressed some criticism of the idea of "disorganization", suggesting that "because defenses are invariably destabilized by the treatment process, the notion of well demarcated categories is of little utility clinically". She has alleged that the disorganized category has had some successes in predicting later outcomes, such as externalizing behaviors; this has magnetized researchers' curiosity and in doing so has taken for granted too much about disorganization as a taxonomic entity, leaving in abeyance questions about differences of mechanism and form

which are of great developmental and clinical significance (see also Beeney et al. 2016). We agree. However, this does not mean that the idea of disorganization lacks clinical significance and the Strange Situation cannot have relevance in clinical assessment. For instance, considering the possibility of contradictions between intentions of behavioral plans, and thinking differentially what might be causing this, is valuable for clinicians as it can help orient us in interpreting behavior. This was a point which, following their friend Robert Hinde (1966), Bowlby (1969) and Ainsworth (1984) both emphasized when discussing how what at the time they called "tension" or "conflict" behaviors (such as misdirected behavior, disorientation, freezing) should be interpreted when shown by young children. However it is a point which has fallen out of view in discussions of "disorganization" to the degree that these behaviors have been hypostatized as mere undifferentiated chaos. Likewise, the implications of disorganization for an infant's expectations of their caregiver have also suffered from subjection to an image of undifferentiated chaos.

Maintaining clarity regarding levels of analysis would allow the researchers and clinicians to widen understanding of the phenomena of disorganization. Perhaps the most important area for further inquiry is regarding differences among D-behav; to date, the behavior indices that go into making a D classification or rating have been invisible in published articles, a matter only discussed by coders. The large majority of first authors of papers reporting Strange Situation results do not themselves have reliability in scoring D and never report on the actual behaviors shown by the infants in their samples. As a consequence there has been little empirical inquiry into whether one mechanism or developmental pathway in infancy is related to the diversity of the indices themselves or whether some indices are more predictive of adverse consequences than others. This is in contrast to the existence of some empirical work regarding the different controlling strategies children in middle childhood may adopt in response to dysregulated caregiving environments (e.g. Main and Cassidy 1988; Solomon et al. 1995; Spieker & Crittenden 2010; also Crittenden 1988 on toddlers). One exception of the neglect of differences in infancy has been the work of Lyons-Ruth (e.g. Lyons-Ruth et al. 2013). Though she does not train attention on the different behaviors indexed in Main and Solomon, Lyons-Ruth has highlighted differences between infants classified D who also show avoidance or resistance and those classified D who do not. More generally she has critically observed that 'to date, few hypotheses have been advanced regarding the mechanisms underlying this striking difference among infants who display disorganized behavior', and that new theory is needed around this topic. This concern was expressed years

earlier (Lyons-Ruth et al., 1999: 83), and yet little inquiry has occurred, though there have been a small handful of studies which have empirically explored the distinction between infants classified as disorganized who show avoidance or resistance and those that do not (e.g. Tharner et al. 2013).

The only published study we know of to have examined the different Main and Solomon indices and their implications, not coincidently, was co-authored by Elizabeth Carlson, a foremost expert and trainer in the D classification (Padrón, Carlson & Sroufe, 2014). Padrón et al. (2014: 202) express deep concern regarding the assumption that disorganized/disoriented attachment represents undifferentiated chaos, calling this a misapprehension which "has moved researchers away from attempting to examine patterns in the attachment behavior of disorganized infants." The researchers divided infants placed in the D classification into two groups. The first group either showed fear (Index VI) or disorientation (Index VII) in the Strange Situation. The other group did not show either Index. They then compared the two groups with respect to affect regulation and orientation as newborns. They found that the group who displayed Index I through V behaviors had indeed been lower in affect regulation than infants who displayed Index VI and VII behaviors, suggesting that the former may be predisposed by neurological difficulties. Certainly other studies have documented rates of stereotypies (Index IV) so high in samples known to have neurodevelopmental disorders that this index had to be discounted (e.g. Willemsen-Swinkels et al. 2000); and there are also other behaviors, for instance in Index III, which may also characterize autism. Unfortunately, Padrón and colleagues did not present data regarding the converse reciprocal hypothesis, i.e., whether fear and disorientation were specifically related to more insensitive caregiving, and they did not have data regarding whether the caregivers displayed frightening or frightened behavior to their infants. In a passage cut to reduce the length of Main and Solomon (1990), an already over-long chapter, it was specified that Index VI and VII were less often seen in the tapes from normative samples, and were frequent characteristic of tapes from maltreated at high-risk groups. However this finding has not been formally established – nor does the field apparently realize that it remains an empirical question. In the three decades since Main and Solomon (1986), we have not seen a single lab report or even mention the distribution of D indices in their sample! Nor has any lab sought to examine the consistency of expressions of disorganized behavior shown by a child from one Strange Situation to a second. The behaviors have become invisible to the field, with attention paid exclusively to the classification and its correlates.

Besides conceptual problems, another impediment to inquiry into subgroups has been the issue of cell-size. Too few infants are placed in the disorganized category in most samples, it is sometimes argued, to make subtype analysis possible. As a result, the field has generally regarded differentiation of the disorganized classification into additional discrete categories as leading away from rigorous developmental science and towards idiographic or qualitative analysis. This is a fair concern on its own terms, and particularly pressing in the context of current heightened anxiety about replicability. However, it can be circumvented by significant degrees. In the last decade the 1-9 scale used to score D-class has increasingly also been treated as 'a continuous measure of extent of disorganization' in order 'to maximize the power of the analyses' (Bureau et al. 2009: 270; cf. Waters & Beauchaine 2003). Attention to disorganization as continuous rather than categorical is in line with Main and Cassidy's (1988) forgotten proposal that the phenomenon of disorganization itself should in the first instance be regarded as a dimension, not a category. Yet the 1-9 scale is actually a measure of extent of coder certainty that disruption of the attachment system (D-sys) is *present in some way*, not the *extent* of D-sys. High certainty of the presence of disruption may be the result of the extent of disruption, but it may not, raising questions of validity.

Existing approaches to inquiry could be sharpened through researchers giving attention to one or several clusters of D-behav suggestive of the same form or same degree of D-sys. In high-risk samples most infants will have a score on the Main and Solomon (1990) 1-9 scale of ≥3, and in many normative samples nearly half the sample will have a ≥3 score for disorganization. This prevalence of D-behav is surprisingly little discussed – a fact which has buttressed confused attempts to use assessment for D-behav as a screening tool for child maltreatment (see Granqvist et al. 2016 for a discussion). It is a function of the reification of the D/not-D boundary and the associated lack of attention to the indices themselves. Since most infants in samples with at least one risk factor display *some* behavior in the Main and Solomon indices, dimensions could be forged and validated which need not require large numbers of infants to be investigated, and could be pursued on already-existing data. Such an approach would be in line with the recommendation made by Bakermans-Kranenburg and van IJzendoorn (2009: 250) for work with the Adult Attachment Interview, who observe that "the unresolved classification may be less than optimally discriminating between clinical phenotypes" and propose that reporting results from a small number of dimensions addressing lack of resolution would represent an advance for the field if these could be successfully validated. In addition, based on experiences of teaching students to code the

Strange Situation, we expect that learning to scale a small number of dimensions (e.g. extent of displayed fear of the caregiver, extent of disorientation, extent of conflict behavior without display of fear) would likely be easier for trainees than learning to calibrate the boundaries of the underspecified "disorganized attachment" classification, and rates of success in achieving reliability would be higher. However, to date, it appears that the possibility of differentiated dimensional analysis of infant disorganized behaviors across the D/not-D reified boundary has been obscured, in good part, by confusion of levels of analysis.

For researchers who may wish to pursue this line of inquiry, we would flag one further problem with Main and Solomon's chapters which should be taken into account: the problematic "in-but-out" status of infant caregiving behaviors to the operationalization of disorganization. Interactions in which a child is offering care to the parent have been observed in the reunion behaviors of older infants and toddlers (Crittenden 1988; Cramer et al. 1990) and pre-schoolers and older children (Main & Cassidy 1988; Cassidy & Marvin 1992). However, they do not feature in the published Main and Solomon (1990) indices, as they were not a behavior that prominently featured in the tapes used for formulating the system; an elaborated caregiving response is rare in younger infants (<15 months) seen in the Strange Situation, as it likely has certain developmental requisites. Yet in the mid-1990s, Main made a number of amendments to the Main and Solomon indices in an unpublished text distributed to those learning to code disorganization from Elizabeth Carlson. Main added an "overbright greeting" as a D-behav, extrapolating back to infancy from the role of this behavior in her 6-year system (Main & Cassidy 1988). The logic was that a child showing an overbright greeting to their parent when they are anxious in the Strange Situation may be regarded in a sense as contradictory to the attachment behavioral system, in which the adult is expected to serve as caregiver (D-sys). Presently, as a result, overbright behaviors by an infant can inform a coder making a D classification. But this has occurred without differentiation from other forms of disorganization advised by Main and Solomon (1990), and without published discussion. The potential link between infant overbright behaviors and a controlling-caregiving classification later in childhood would be a testable question. But one important consequence of the invisibility of D-behav in the field's discussions to date is that no investigation has been made of their potential developmental trajectories. If scales are elaborated to code different behaviors currently piled together as "disorganization", infant overbright behavior should, we think, be considered and conceptualized carefully as a possible additional scale.

Conclusion

Main and Solomon (1990: 156) warned in the last pages of the chapter announcing the protocols for coding disorganization/disorientation that treating the items in a group as a reified category can offer undue support to beliefs that there are no meaningful differences within this group. We have not found any subsequent published work that has cited this warning. More recently Sroufe and Carlson, who have trained the large majority of current coders of the disorganized/disoriented attachment classification, have argued that the concept of "disorganization" itself has misdirected researchers and clinicians. In agreement with these concerns, we have here attempted here to clarify the concept of disorganized attachment. In particular, we have expressed concern that the elided difference between i) the behaviors listed in the Main and Solomon indices, ii) disruption of the attachment system, and iii) D as a taxonomic entity – where all are called "disorganization" – has made the indexed behaviors seem simple and equal instantiations of "disorganization" as a unitary process. Main and Solomon set out to serve as cartographers of relatively new terrain, and the resulting encompassing operationalization has supported a convergent, international research program. However, the conceptual map produced in 1990 is now in need of updating and respecifying, and this greater precision need not be at the expense of statistical power if a differentiated dimensional rather than categorical approach were to be developed and validated. Greater conceptual clarity and the resulting awareness of complexity will, we hope, help address unrecognized issues of construct validity and their effects, and usher in work to reimagine the D category, as well as controlling-caregiving, as a set of more sensitive, dimensional scales. This may also include asking questions of discriminant validity in relation to the seven indices, given that Index IV especially (and some parts of Index III) contains behaviors that can readily be attributable to other causes than disorganization at the level of the attachment system.

In response to this paper, we suspect that people will want to know what, terminology aside, disorganization *is*. The issue is that, to an uncomfortable degree, we do not know – due in large part to the invisibility of the different indexed behavior (D-behav) in analyses to date and a lack of interest in different forms of disruption at the level of the attachment system (D-sys). It would seem that infants classified as D within a sample have a good deal in common, as in the Luijk et al. finding that on average these infants had flattened diurnal cortisol

pattern. However, it not clear that such effects are equally a product of all disorganization, or that disorganization is a single process. Moreover, we cannot assume that disorganization is the same disorganization – and carries the same level of risk – when shown by maltreated children, children who have experienced repeated separations from the caregivers, and children of parents suffering from an affective disorder (Solomon and George 2016). The field going forward would do well to attend more to differences among behaviors and potential differences of process, matters to date which coders have wrestled with but which are generally made invisible in published papers. We hope that distinctions between levels of analysis will help facilitate such work.

In the latest edition of the *Handbook of Attachment*, Lyons-Ruth and Jacobvitz (2016) urge that, for the field going forward, the behavior and processes of disorganized attachment will need to be differentiated and unwrapped. For instance, they suggest that it will be "important to narrow the current research criteria for disorganization to include only the forms to be considered disordered". In identifying different levels of analysis folded together within current imprecise ways of thinking about "disorganization", we have set out to tidy discussions of "disorganization" towards such an end. A more effective common frame of reference is intended to support clinicians and researchers interested in differences among the behavior and processes lost within the low-resolution construct of disorganized/disoriented attachment as it is presently used. Furthermore, attentiveness to forms of D-sys and the diversity of D-behav will be necessary as the field attempts to build hypotheses about the neural circuits subserving disorganization. We also hope that the distinctions drawn here can help support recognition that there are a variety of pathways to D-class other than fear of the caregiver; misapprehensions around this topic have significant consequences for clinical and social welfare practice. With greater conceptual clarity, the different aspects of the phenomena discussed under the rubric of "disorganization" will more readily remain in sight and sustain attention from researchers and clinicians, and they will more readily be found when they are looked for in the course of both research and clinical discussions and debates.

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